Draft Stanislaus *O. mykiss* Objectives
August 12, 2014

NMFS Steelhead Recovery Goal for the Stanislaus River
Minimum adult escapement of 2,500 over three years, with a minimum effective population size of 500 (census size of standing stock- for every 1 fish returning 2 fish remain in ocean) (850 escapement in one year). This would be measured as a minimum three-year running average of 850 adult steelhead (not counting half-pounders), with a minimum effective population size* of 500 in any given year.

A larger adult escapement would allow for a catch and release steelhead sport fishery in the river, assuming a low level of mortality from hooking and handling. If hooking mortality rates, (defined as total catch and release fishing related mortality up to outmigration as kelts) were an average of 15% (Ashbrook et al. 2010, unpublished WDFW study), then an escapement of 1000 would allow for 850 to survive to the kelt stage.

OBJECTIVE #1: LIFE-HISTORY (ANADROMY/RESIDENCY)

> Goal: Support the fullest expression of O. mykiss life-history diversity in order to increase population stability, resiliency, and productivity. Currently, the SJ tributaries are dominated by resident forms, and need to express more anadromy to meet NMFS recovery goals.
>
> A. Anadromy: the proportion of age-0 fish that eventually smolt vs. remain residents should be a minimum of ___ by ___
>
> Rationale: Age-0 fish have not yet selected a life-history pathway (anadromy or residency). Tracking the proportion that eventually smolt is a measure of the life-history diversity of the *O. mykiss* population.
>
> B. The proportion of all counted adult *O. mykiss* over a full year shall be a minimum of____resident (> x FL) and ___anadromous (> y FL) individuals
>
> Rationale: This objective is also an attempt to improve life-history diversity of the population, but measures it from the perspective of adult O. mykiss.
>
> C. Maintain a minimum resident adult (FL > ___) population number of ___ individuals per square meter or per linear distance (not %)**
>
> Rationale: This objectives seeks to maintain a minimum number of adult residents to allow the continuation of the popular sport fishery, as well as creating a "refuge population" of *O. mykiss* in the river that can potentially give rise to anadromous

progeny.

OBJECTIVE #2: JUVENILE PRODUCTIVITY

A. The density of age-0 *O. mykiss* shall be ___individuals per square meter or per linear distance by year___ in specified reaches.

Rationale: To achieve desired smolt production levels, a minimum number of YOY need to be produced. This objective could be measured though snorkel surveys, efishing, or other appropriate sampling techniques.

B. The growth rates of individual age-0 and age-1 *O. mykiss* shall increase over time (e.g., can we put in the difference in growth rates of Mokelumne River vs. American River fish to have some expectation of mm increase?). An exception to this requirement shall be at age-0 and age-1 densities over ___ and ____, to allow for lower growth rates at high juvenile densities.

Rationale: Faster growing juveniles should produce larger, younger smolts, which are known to have higher survival to the adult stage. This could be measured by capturing, PIT tagging, and recapturing juvenile *O. mykiss* in the river.

C. At least half of the smolts (class 5) observed should be 160 mm FL or greater in length.

Rationale: This minimum length would give us confidence that the smolts being produced have a good chance of surviving to become spawning adults (Bond et al. 2008, Ward et al. 1989). If all the smolts produced were very small, say around 140-160 mm, survival to maturity would likely be very low.

D. The number of smolts produced shall increase over time to an average of ___ by year ___.

Rationale: Even at good smolt to adult return rates, a minimum number of smolts is needed to achieve the adult abundance goal.

OBJECTIVE #3: ADULT SPAWNING

A.When steelhead are present, eggs will have an egg-emergence survival rate of __%
(measured by surrogates (e.g., egg trays) and/or as projected by monitoring of
temperature, flow, sediment deposition, and scour)

Rationale: Stream conditions should be suitable for successful spawning and rearing of
eggs and alevins.

Notes on Measurement:
Can do some egg survival studies (implant eggs and measure survival in time and space)?

Monitor redd construction, temperatures, and flows

OBJECTIVE # 4 –JUVENILE SURVIVAL (AS A PROXY FOR POPULATION PRODUCTIVITY)

Goal: Attain steelhead productivity (survival rates) necessary in order to attain (a)
"doubling" rate of population growth (b) resilience to low populations (re-attainment of
abundance targets following years of poor recruitment) and (c) survival/CRR rates
"typical" of this life-history type.

Apply survival rates (productivity objective) using same methodology as calculated for
fall run Chinook. Set needed number of smolts to reach 850 adults (assuming a smolt to
maiden spawner survival based on BDCP objectives?).

___% of silvery parr and smolts (stage 4 and 5 O. mykiss) counted at (lower end of
gravel bedded reach) must be detected at (survive to lower river/beginning of Delta) ___.

Rationale:
Apply same survival methodology to steelhead escapement as we applied to fall run
escapement, but with a goal of 850 adults.